Are “left-behind” children really left behind? A lab-in-field experiment on the impact of rural/urban status and parental migration on children’s social preferences

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Abstract
Decades of economic reform have led to an unprecedented growth of economically driven rural-to-urban internal migration in China. Many migrant parents leave their children behind. According to figures from China’s 2010 census, more than 61 million children from birth to 17 years were “left behind.” These left-behind children, representing an important segment of the population, deserve research attention if we would like to understand the profound socioeconomic implications of this migration process.

In this lab-in-field experiment, we explore whether parental migration status has a significant influence on children’s social preferences exhibited via three simple allocation games. We study samples from four populations: rural children left behind by both parents, rural children left behind by one parent, rural non-left-behind children, and urban children. Our results show that for rural children there is no significant difference between having one parent or two parents at home. Surprisingly, they indicate that while eight- to nine-year-old children in grade three exhibit no significant differences in social preferences related to the migration status of their parents, by grade five children with no parents at home have developed significantly more pro-social, less envious, more altruistic, more sharing and less spiteful attitudes compared to those with at least one parent at home. While both rural children left behind by both parents and urban children develop significantly more altruistic preferences on average from grade three to grade five, rural children with just one parent at home do not, and demonstrate significantly less altruistic attitudes than urban children in both grades.

Keywords: Children; Other-regarding preferences; Social preferences; China; Experiment; Migration.

JEL Codes: D63, D64, D91, J61

Highlights
- We examine the social preferences of grade 3 and 5 rural and urban children in China.
- We run a lab-in-field experiment using three simple allocation games.
- We compare rural children by parent migration status to each other and city children.
- Grade-5 children with no parent at home are more altruistic than other rural children.
- Rural children with 1 parent at home are less altruistic than urban children.
1. Introduction

Decades of economic reform have led to unprecedented growth fueled by economically driven rural-to-urban internal migration within China. With an urban population that has climbed to 52.6% in 2012 from 20.9% in 1982 (National Bureau of Statistics of China, 2014), China is experiencing what has often been described as the largest migration in human history. According to Lu and Xia (2016), 273 million people now live in a place where they do not have a local hukou\(^1\) in China and the majority of these people are rural-to-urban migrants. With the current push for further urbanization and industrialization, it is inevitable that rural to urban migration will continue and remain an important force behind China’s economic growth.

Although migrant workers have made important contributions to the economic development of urban centers,\(^2\) the discriminatory hukou system leads to their employment, social and residential segmentation, and hinders their and their family members’ access to key public-services such as education, health care and social security in urban areas. Due to this institutional barrier as well as the financial burden of raising children in urban areas (Xiang, 2007), the vast majority of migrant workers leave their children at home and entrust them to the care of a remaining parent or relatives and friends. These children have been called “left-behind” children (Asis, 2006; Liang and Ma, 2004). It is estimated that more than 61 million children under the age of 17 are classified as left-behind in China (Ai and Hu, 2016), a number equivalent to the number of all the children in the US (The Economist, 2015). In total, left-behind children account for 38 percent of all rural children and 22 percent of all children in China (All China Women’s Federation Research Group, 2013).

There is a growing body of literature focusing on migrant workers and various migration outcomes such as socioeconomic achievements, cultural integration, and health and health-care

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\(^1\) Hukou (household registration) is a registration identity that classifies a person as either “nonagricultural” or “agricultural” and determines a specific hukou location, which is usually based on where one’s parents originated. A hukou entitles a person at his/her location to employment and is linked to locally financed social security and public services, and thus often results in discrimination against migrants as very few people can change their hukou status and/or location.

\(^2\) For example, Sun (2004) reported that the proportion of gross domestic product (GDP) created by migrant workers was 32% for Beijing’s, 31% for Shanghai’s and 30% for Guangdong’s.
outcomes (Liang and Ma, 2004; Wen and Wang, 2009). However, this literature has
concentrated mainly on adult migrants, largely ignoring a critical externality of the migration
process, namely the children left in the original rural communities by one or both parents. A
nascent literature on left-behind children has examined the psychological well-being, and
educational and health outcomes of being left-behind. Many studies have provided evidence that
the environment for left-behind children has been relatively unfavorable (e.g., Asis, 2006) with
left-behind children being disadvantaged along a number of dimensions, ranging from physical
health outcomes, cognitive and academic achievements, self-esteem, loneliness, and school
engagement (e.g. Ai and Hu, 2016; Biao, 2007; Chang et al., 2011; Fan et al., 2010; Hu and Li,
2009; Hu et al., 2014; Li and Wen, 2009; Li, et al., 2010; Luo, et al, 2008; Song and Zhang,
2009; Tao et al, 2013; Ye et al., 2006; Zhang, Li et al., 2014; Zhao, Chen et al., 2014; Zhao, Yu
et al., 2014).

However, there are also other studies that reported no adverse effects on these children’s
psychological and/or physical well-being (e.g. Xu and Xie, 2015; Zhang, Behrman et al., 2014;
Zhou et al, 2015). For example, a notable, large-scale study conducted only on rural children in
China by Zhou et al. (2015) represents the first multi-provincial sample study of Chinese
migrants’ children that examines multiple outcome variables including health, nutrition, and
education. The authors reported that left-behind children actually scored equally and in a few
areas slightly better than those living with both parents. Moreover, the authors suggested that
there is a “care-versus-resources” trade-off as well as a selection effect at play. Firstly, while
children living with both parents receive more face-to-face care from their parents than left-
behind children, left-behind children have access to more financial resources than the children of
non-migrants. Secondly, there is a self-selection effect as parental characteristics of migrant
families may be fundamentally different from non-migrant ones.\footnote{For example, Hao et al. (2016) reported the first incentivized artefactual field experiment conducted in China to understand whether migrants differ from non-migrants in terms of preferences regarding risk, uncertainty and competition in various contexts. Their results show that, compared to non-migrants, migrants are significantly more likely to enter competitions and are more risk tolerant in a strategic environment.} Notwithstanding this main
result, Zhou et al. (2015) warned that their findings should not be construed to imply that left-
behind children are not vulnerable. Rather, they stressed that all rural children sampled in their
study perform poorly on most of the indicators considered, which is a consistent finding in the
literature (e.g. Sylvia et al., 2015; Wang et al., 2015; Shi et al., 2015) and that “all rural children
are vulnerable and need extra care, attention and resources” (p. 1969).

The left-behind children, and rural children in general, representing an important segment
of the population directly influenced by this massive rural-to-urban migration in China, deserve
serious research attention to understand fully the profound socioeconomic implications of this
migration process. Although there is a burgeoning literature investigating the physical and
mental outcomes of parental migration on children, to our knowledge, there has been no research
effort to explore how such children develop key economic preferences such as altruism,
egalitarianism and spitefulness, which fundamentally shape human socioeconomic interaction
and outcomes. Our experiment represents the first such investigative endeavor.

The majority of the literature on internal migration in China defines a migrant family as
having at least one parent who has migrated to an urban area. Thus, a left-behind child is defined
as one who lives in a single parent family, or in a no-parent family within which he or she is
cared for by grandparents, relatives, nonrelatives, or nobody at all (e.g., Liu, Li, and Ge, 2009).
However, several studies have found that while having one parent at home makes little
difference compared to having two parents at home, significant differences do occur when both
parents have migrated to the city (e.g., Zhang, Behrman et al. 2014; Zhou, Murphy, Zhou, and
Tao, 2014). We therefore consider four subject groups: rural children left behind by both parents,
rural children left behind by one parent, rural children with both parents at home, and urban
children. We explore how parental migration status and rural status may influence a child’s
other-regarding preferences as measured by simple allocation tasks (e.g. Fehr, Bernhard and
Rockenbach, 2008; Fehr, Glätzle-Rützler, and Sutter, 2013). Moreover, we collect data about the
children’s school grade level (a proxy for age), gender, cognitive intelligence, number of
siblings, family wealth, ethnicity, locus of control, and school engagement, and explore the
potential impact of these demographic and psychological variables on social preferences.

2. Related Literature on Social Preferences in Children

In the field of developmental psychology, studies have reported that pro-social preferences develop with age during childhood (e.g. Eisenberg et al., 2006; Malti et al., 2012; Warneken and Tomasello, 2006). Most of these studies have focused on pro-social behavior such as instrumental or altruistic helping or providing emotional support for needy others, and such behaviors are either measured experimentally, or assessed through observations, parent reports or teacher reports (see a comprehensive survey of related work in this area by Eisenberg and Fabes, 1998).

There is a growing literature in experimental economics that investigates the influence of age on the developmental formation of economic preferences and decision-making. Harbaugh and his colleagues are the earliest contributors to this area of research and have investigated children’s economic decision making in a wide array of domains such as rationality in revealed preferences (Harbaugh et al, 2001), risk aversion (Harbaugh et al., 2002), altruism (Harbaugh and Krause, 2000), and trust and trustworthiness (Harbaugh et al., 2003). In the domain of pro-sociality and other-regarding preferences, Fehr et al. (2008, 2013) report that selfishness dominates among three- and four-year-old children, while inequality-aversion develops strongly up to the age of eight years. Subsequently, a weak form of altruism develops over the age range of 8-17 years, while spiteful motives diminish during this period. Almas et al. (2010) document the development of more complex notions of fairness over time. Bauer et al. (2014) report that children (aged 4-12) of parents with low education are more spiteful, more selfish and less altruistic and overall become less spiteful and more altruistic with increasing age. A number of other papers also document how age influences social preferences (Houser et al., 2012; Martinsson et al., 2011), risk aversion (Eckel et al., 2012,), time discounting (Bettinger and Slonim, 2007; Angerer et al. 2015), trust and trustworthiness (Sutter and Kocher, 2007) and honesty (Bucchiol and Piovesan, 2011; Glatzle-Rutzler and Lergetporer, 2015; Maggian and Villeval, 2016).
A key result from this literature pertinent to our study is that nurture and socialization both play important roles in the development and formation of economic preferences and related behavioral traits during childhood and adolescence. If nurture and socialization influence the development of fundamental economic preferences and decision-making, then it is vital to examine whether and to what extent a parent’s migration and subsequent absence may influence socialization and thus the formation and shaping of his or her children’s social preferences. *A priori*, there are several plausible reasons why parental migration could matter: children may differ in the kind of socialization they receive; they may be exposed to different values, and they may grow up in very different family environments. A primary goal of our paper is thus to explore whether there is any impact of parental rural-urban migration on the development of social preferences among rural children.

It is also possible that the preponderance of families with migrating parents not only affects other-regarding preferences of their own children, but affects the entire rural community through its effects on local social norms. In addition, nurture and socialization may also differ between the city and the countryside for reasons apart from migration, reflecting the different requirements for and/or values congruent with success in each environment. This argument was put forward persuasively in the classic *Xiangtu Zhongguo* written in the mid-1940’s by Fei Xiaotong and available in an excellent translation (Fei, 1992). Accordingly, a second goal of our paper is to investigate whether there are differences in the development of key social preferences in the urban versus the rural environment in modern China.

Our results show that for rural children there is no significant difference between having one parent or two parents at home. Surprisingly, they indicate that while eight- to nine-year-old children in grade three exhibit no significant differences in social preferences related to the migration status of their parents, by grade five children with no parents at home have developed significantly more pro-social, less envious, more altruistic, more sharing and less spiteful attitudes compared to those with at least one parent at home. While both rural children left behind by both parents and urban children develop significantly more altruistic preferences on
average from grade three to grade five consistent with Fehr et al. (2008, 2013), rural children with just one parent at home do not, and demonstrate significantly less altruistic attitudes than urban children in both grades.

3. Experimental Design and Procedure

3.1 Subject pool and procedure

The rural area where the field experiment was carried out is Kaitang county in Guizhou province, which is located in the southwestern part of China. Guizhou is one of the least developed provinces in China, with inhabitants possessing an average of 6.75 years of schooling (Carlsson et al., 2012) and producing a GDP per capita of 33,632 Chinese Yuan in 2017, equal to just 62% of the national average of 53,817 Yuan (Bureau of Statistics of Guizhou, 2017). The comparable urban sample was selected from a primary school of similar size in the city of Kaili, also in Guizhou province. The urban and rural schools are about 30 kilometers apart. All sessions were run in class during regular school hours. We randomly selected ten classes in grades 3 and 5. A total of 470 students participated in the experiment: 280 from six classes in the rural area (50% are grade-3 students and 55% are boys) and 190 in four classes from the urban area (48% are grade-3 students and 52% are boys).

The social preference experiment reported in this paper was one of several experiments conducted during the same session using the same participants. Some of the other experiments are discussed elsewhere (Cadsby, Song and Yang, 2018). At the beginning of a session, the experimenter described the session as a scientific project that would study decision making in children but did not reveal any details of the experiment. Students were informed that they would earn various kinds of “goodies” by playing some games. The “goodies” (e.g. candies, mechanical pencils, erasers, compasses, little toys etc.) were presented on the table at the front of the

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4 The other experiments included a die-under-cup task that focuses on honesty behavior, a prisoner’s dilemma game, a risk-aversion elicitation and a trust game. This social preference experiment was positioned at the very beginning of the experimental session. Given that these experiments involved the same subjects, there is some overlap in our descriptions of the background and demographics for this study and for Cadsby, Song and Yang (2018), which studies cheating behavior. However, the decision data analyzed and issues addressed in these two studies are entirely different.
classroom and were shown throughout the session. We solicited each student’s willingness to participate in the experiments. All students gave their consent.

The experiment was run as a paper-and-pencil experiment where participants had to indicate their decisions in a booklet, within which each decision was presented on a separate page. Each decision task was carefully explained one at a time and all participants had to answer one or two control questions to check their understanding before using the decision form at the bottom of the page to record their decisions for a given task (see Appendix 1 for the complete set of experimental instructions and instruments for the allocation tasks used to elicit social preferences). In order to eliminate potential confounds of learning, reputation-building or other strategic motives, all games in the experiment were one-shot games and those games with partners used re-matching protocols between games and partners that were anonymous to each other. Lastly, all games were incentivized with different types of "goodies" to minimize satiation or wealth effects.⁵

After participants completed all the decision tasks, they were given another booklet to complete to enable us to gather additional demographic data. The first part of the second booklet contained a section of the Raven Progressive Matrices (Raven et al., 2004) test, a widely used and reliable nonverbal test of cognitive intelligence that has been used for children frequently in the literature. Besides intelligence, we also collected demographic information about each participant including: 1) gender; 2) grade level, 3 or 5 (age 8-9 or 10-11 respectively); 3) ethnic background - Han ethnicity or not; 4) whether he/she was living with one or two parents at the time; 5) family wealth, proxied by the number of major electronic appliances such as TV set, fridge, etc., owned by the family; 6) number of siblings; 7) self-reported school engagement; and

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⁵ While it is a usual practice with adult subjects to pay for one randomly selected task when there are multiple tasks in an experiment, paying for each task is common in experiments with children as subjects because it is simpler for children to understand. A legitimate concern with paying for each task is that children may think about the total allocations resulting from the multiple choices instead of considering payoffs in each individual game separately. This is unlikely in our setup, because the children made choices sequentially, did not know how many choices were to come, and did not know what the allocations in subsequent tasks would be. Furthermore, the payoff medium in each task was different, ranging from Rainbow Candy (pro-social task) and Gummy Bears (envy task) to Oreo cookies (sharing task). See below for detailed descriptions of the tasks.
8) locus-of-control. School engagement was measured by a three-question survey (Hu et al., 2014), producing a measure from 1 (highest engagement) to 4 (lowest engagement). Originally developed by Rotter (1966), the locus of control questionnaire measures the extent to which one believes that the outcomes of events in one's life are contingent on what one does (internal control orientation) or on forces outside one’s personal control (external control orientation) with 1 representing the highest internal control orientation and 4 representing the highest external control orientation.

At the end of the session, a research assistant went over the earnings from each task with each participant and gave him/her the goodies he/she earned in the experiment according to the outcomes of the games. The whole session took about an hour to complete.

3.2 Key measures

We adopted the three simple allocation tasks developed by Fehr et al. (2008), which have been used successfully on very young children aged 3-8. Each participant was matched with one anonymous partner from the same age cohort and was asked to choose between two allocations that assigned a payoff between him/herself and the randomly-assigned partner. The pairing was re-matched for each of the three tasks. These three tasks were described as “Allocation Games” to the children. The first task, the pro-social game, offered a choice between (1, 1) and (1, 0), which was always 1 for the decision maker but 1 or 0 for the partner depending on the decision-maker’s choice. This game serves as a measure of the most basic form of pro-sociality, namely the willingness to choose an allocation that benefits the partner by equalizing his/her earnings with those of the decision maker at no cost to the decision maker. In this task a choice of (1,1) is consistent with three distinct motives: 1) an egalitarian preference that avoids inequality (Fehr and Schmidt, 1999); 2) an efficiency concern (Charness and Rabin, 2002); and 3) self-interest if the participant chooses randomly as there is no difference in payoff to the decision maker between the two choices.

The second task, the envy game, offered a choice between (1, 1) and (1, 2), which is always 1 for the decision maker but 1 or 2 for the partner depending on the decision-maker’s
choice. As in the first task, the decision maker can increase the partner’s payoff at no cost to him/herself, but in this task such a choice results in disadvantageous inequality. Analyzing the choices in tasks 1 and 2 together, a choice of (1,1) in both games would indicate a person who is inequality-averse or egalitarian; a choice of (1,1) in task 1 and (1, 2) in task 2 would indicate a person who is altruistic.

The third task, the sharing game, offered a choice between (1, 1) and (2, 0). Thus, in this task a simultaneously altruistic and egalitarian choice of (1, 1) is costly for the decision maker. Such a choice indicates a strong form of altruism or inequality aversion because it requires a sacrifice by the decision maker to achieve the altruistic/egalitarian allocation. A person who chooses the allocation that is most detrimental to his/her partner in all three tasks, i.e., (1,0), (1,1) and (2,0) in the three tasks respectively is deemed to possess spiteful preferences (Fehr et al., 2008.)

4. Results

4.1 Data overview and demographic differences across treatment groups

All 470 children completed the study. In Table 1, we present an overview of our key data, categorizing all participants into either rural children left behind by both parents (n=132), rural children left behind by one parent with the other parent at home (n=98), rural children with both parents at home (N=50), or urban children (n=190). We also present summary data on the aggregate of all rural children. The urban/rural categorization is based on whether a child’s residence and school were in the rural area or in the city. If we follow the most widely adopted definition of left-behind in the literature, defining a child’s status as left-behind if at least one

6 Fehr et al. also distinguish between those who are strongly and weakly altruistic and between those who are strongly and weakly egalitarian. In both case, the strong or weak designation depends on whether the subject chooses (1, 1) or (2, 0) in the sharing task. In particular, a person making altruistic (egalitarian) choices in the prosocial and envy tasks is deemed strongly altruistic (egalitarian) if he or she chooses (1, 1) in the sharing task. For simplicity of exposition, we ignore this distinction.

7 One rural child did not make a decision for the envy allocation. Thus, 279 rather than 280 rural children provided data for envy, and therefore for the altruistic, egalitarian and spiteful preference profiles that depend on the decisions in all three allocation tasks. Moreover, ten rural children (including the one who did not make a decision for the envy allocation) and four urban children did not provide a complete response to the demographic questionnaire. Thus, the rural regressions with demographics use 270 observations and the urban versus rural regressions with demographics use 456 observations.
parent is not living with the child and is currently a migrant worker in the city, the majority of the children in our rural sample (82%) are left-behind. Among the left-behind children, more than half have neither parent at home, while for those who have one parent at home, about half lived with their mothers (n=47).

The demographic differences are stark between the urban and rural children. Overall, urban children score significantly higher on the Raven IQ test \( (p<0.001) \), have fewer siblings \( (p<0.001) \), are more likely to be of Han ethnicity \( (p<0.001) \), are wealthier \( (p<0.001) \), and exhibit higher internal locus-of-control \( (p=0.02) \) and higher school engagement \( (p=0.03) \). A parallel comparison between children left-behind by at least one parent and non-left-behind children in the rural area, however, reveals much smaller gaps. Specifically, left-behind children score higher on the Raven IQ test with marginal significance \( (p=0.07) \), but are from poorer families \( (p=0.002) \). There are no significant differences in the frequency of being of Han ethnicity or the number of siblings. In terms of psychological dimensions, left-behind children have significantly higher external locus of control \( (p=0.009) \). This demographic snapshot is consistent with a recent large-scale non-experimental study (Zhou et al., 2015) in that, compared to their urban counterparts, rural children in general are disadvantaged in terms of SES status.

4.2 Key results

Table 1 also summarizes the six dependent variables: the frequency of choosing the allocation indicated by the label for each of the three games, namely pro-social, envy and sharing, as well as the categorization of the three other-regarding preference profiles, namely altruistic, egalitarian and spiteful, from each sub-population group based on hukou status, parental migration status and grade level.

We first investigated whether and to what extent parental migration status influences rural children’s other-regarding preferences using linear probability regressions. Table 2 reports

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8 For locus of control, 1 represents the maximum internal locus of control, while 4 represents the maximum external locus of control. For school engagement, 1 represents the highest level of school engagement, while 4 represents the lowest level.
the results of two such regressions, based on the rural data only.\(^9\) Model 1 regresses the six dependent variables on the following independent variables: Grade3 Dummy, a dummy variable equal to 1 for students in grade 3 and 0 for students in grade 5; Ph1or2, a dummy variable equal to 1 when at least one parent is at home and zero otherwise;\(^10\) Ph2, a dummy variable equal to 1 when two parents are at home and zero otherwise; and interactions between Grade3 and Ph1or2 and between Grade3 and Ph2. Model 2 adds Raven, the number of questions answered correctly on the Raven test and its interactions with Grade3 and/or Ph1or2 and Ph2, and also adds the demographic and psychological variables outlined earlier as controls.\(^11\) Raven is centered at its grand mean over the entire rural and urban sample. Thus, the coefficients and statistical tests performed on grade level or migration status indicate marginal effects at the grand mean Raven score. Notice that this choice of coding makes grade 5 children who are left behind by both parents the benchmark group. The coefficient on Ph1or2 indicates whether having one parent at home is associated with making different allocation choices than having none at home. The coefficient on Ph2 indicates whether having both parents at home is associated with making different choices than having just one parent at home.\(^12\) Each model was also tested for differences between males and females by using a gender dummy and interacting it with all of the other independent variables in each model.

**Result 1:** There are no significant differences in either model between the reactions of rural girls and rural boys to the number of parents at home, grade level or the

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\(^9\) Logit regressions not reported here but available from the authors yield results consistent with those of the linear probability regressions and associated tests reported in Table 2.

\(^10\) For simplicity of exposition, we did not distinguish between whether the one parent at home was the mother or the father in the reported regressions. However, in regressions not reported here, we find no significant difference between the presence of a mother versus the presence of a father for any of the six dependent variables.

\(^11\) Specifically, these are a Han dummy equal to one for Han ethnicity, and zero otherwise; family wealth measured by the number of major electronic appliances such as TV sets, fridges, etc., owned by a family; number of siblings; and school engagement and locus of control, both measured from 1 to 4 as described in detail above.

\(^12\) Although Ph1or2 = 1 for both the cases of one parent at home and both parents at home, the presence of Ph2 =1 when both parents are at home means that the coefficient on Ph1or2 measures the effect of having 1 versus 0 parents at home, while the Ph2 coefficient examines that difference between having two parents versus one parent at home. We chose this coding in order to highlight our finding that it is not the traditional definition of left behind by either one or both parents that is associated with different allocation choices, but rather solely being left behind by both parents and having no parents present at home that is critical.
demographic controls in model 2 except for the choice of the sharing allocation. This is demonstrated by adding a dummy variable for gender to each model, interacting that gender dummy with all of the other independent variables, and running a joint F-test of the null hypothesis that the main effect of gender and of all of its associated interactions are jointly zero. The $p$-values were not significant for pro-social, envy, altruistic, egalitarian, or spiteful, but were significant for sharing ($p=0.061$ for model 1, $p=0.036$ for model 2). The details of the gender differences are not the focus of this study. We therefore aggregate the data for rural boys and girls in the analysis that follows, and report separate sharing regressions for boys and girls in Appendix 2.

Result 2: In grade 3, there are no significant differences between children left behind by both parents and those with one or both parents at home for pro-social, envy, and sharing allocations, or for altruistic, egalitarian, and spiteful preference profiles in either model 1 or model 2. In Table 2 under the header Grade 3 Effects for each model, all of the F-tests for the impact of Ph1 or 2 on each dependent variable fail to reject the null of no effect, meaning there is no significant difference in allocation choices in grade 3 between choices made by children who have been left behind by one parent and those who have been left behind by both. Moreover, the same is true for the F-tests for the impact of Ph2 on each dependent variable, meaning that in grade 3 there is also no significant difference between the choices of children left behind by one parent and those with both parents at home.

Result 3: Grade 3 rural children left behind by both parents are significantly more envious, and as a result significantly less altruistic and more egalitarian than grade 5 rural children left behind by both parents. In Table 2, this is indicated by the significant coefficients on the Grade3 dummy for envy ($p=0.001$ without demographics, $p=0.012$ with demographics), altruistic ($p=0.008$ without demographics, $p=0.031$ with demographics) and egalitarian ($p=0.015$ without demographics, $p=0.027$ with demographics). There are no significant differences between grade-3 and grade-5 rural children who have at least one parent at home for envy or any of the other allocation tasks or preference profiles. This is indicated by a series of F-tests of the
null hypothesis $\text{Grade3} + \text{Grade3} \cdot \text{Ph1or2} = 0$ for each dependent variable and model, none of which rejected the null hypothesis of no effect.

**Result 4:** In grade 5, children with one or both parents at home are less pro-social, more envious, less sharing, less altruistic, and more spiteful than children left behind by both parents. In Table 2, this is indicated by the significant coefficients on Ph1or2 for pro-social ($p=0.091$ without demographics, $p=0.085$ with demographics), envy ($p=0.014$ without demographics, $p=0.012$ with demographics), sharing ($p=0.033$ without demographics, $p=0.029$ with demographics), altruistic ($p=0.017$ without demographics, $p=0.008$ with demographics), and spiteful ($p=0.091$ without demographics, $p=0.071$ with demographics). In all of these cases, the coefficients on Ph2 are insignificant, indicating that there are no significant differences between allocation choices of children who have one parent at home and those who have two parents at home.

**Result 5:** The main effect of Raven was not significant for any allocation or preference-profile variable. Although some interactions of Raven with migration and/or grade level were statistically significant, their addition to the regression as controls had little impact on the significance of the migration or grade-level variables for any of the allocation tasks or preference profiles. Of the other demographic or psychological variables, only the dummy for Han ethnicity was statistically significant and that was only for the sharing allocation. The coefficient on the Han dummy was 0.31 ($p=0.037$) in the sharing regression with controls. However, this is of little real significance since there were only 8 children of Han ethnicity among our 280 rural subjects. As indicated above, results 2, 3, and 4 all hold with or without the presence of Raven, its interactions and the other demographic and psychological controls.

We continued our investigation by examining whether and to what extent rural versus urban residence influences children’s other-regarding preferences using linear probability regressions. Table 3 reports the results of two such regressions, based on both the urban and the
rural data. Model 3 regresses the six dependent variables on the following independent variables: Grade3 Dummy; Rural Ph0, a dummy variable equal to 1 for rural children when there are no parents at home and zero otherwise; Rural Ph1, a dummy variable equal to 1 for rural children when one parent is at home and zero otherwise; Rural Ph2, a dummy variable equal to 1 for rural children when both parents are at home and zero otherwise; and interactions between Grade3 and Rural Ph0, between Grade3 and Rural Ph1, and between Grade3 and Rural Ph2. Model 4 adds centered Raven, and its interactions with Grade3 and/or Rural Ph0, Rural Ph1 and Rural Ph2, and also adds the demographic and psychological variables outlined earlier as controls. As in models 1 and 2, Raven is centered at its grand mean over the entire rural and urban sample. Thus, the effects of grade level or urban versus rural by migration status are marginal effects calculated at the grand mean Raven score. Notice that the choice of coding makes urban children the benchmark group. The coefficient on Rural Ph0 (Rural Ph1) [Rural Ph2] indicates whether rural children left behind by both parents (left behind by one parent) [with both parents at home] make different allocation choices than urban children. As with models 1 and 2, models 3 and 4 were also tested for differences between males and females by using a gender dummy and interacting it with all of the other independent variables in each model.

**Result 6: There are no gender differences in the impact of rural versus urban residence on any of the allocation tasks or preference profiles except for sharing.** As with models 1 and 2, this is demonstrated by adding a dummy variable for gender to each model, interacting that gender dummy with all of the other independent variables, and running a joint F-test of the null hypothesis that the main effect of gender and of all of its associated interactions are jointly zero. The \( p \)-values were not significant for pro-social, envy, altruistic, egalitarian, or spiteful, but were significant for sharing (\( p=0.020 \) for model 3, \( p=0.017 \) for model 4). As with

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13 Logit regressions not reported here but available from the authors yield results consistent with those of the linear probability regressions and associated tests reported in Table 3.
14 See footnote 10 for details.
models 1 and 2, we aggregate the data for rural boys and girls in the analysis of models 3 and 4 that follows, and report separate sharing regressions for boys and girls in Appendix 2.

**Result 7: In grade 3, rural children left behind by one or both parents exhibited significantly more envy and correspondingly less altruism and more egalitarianism than urban children with or without the demographic controls.** In Table 3, under the header Grade 3 Effects for each model, the F-tests for the impact of Rural Ph0 and Rural Ph1 in grade 3 both reject the null hypothesis for Envy (p=0.002 for Rural Ph0 without demographics, p=0.02 with demographics; p=0.002 for Rural Ph1 without demographics, p=0.05 with demographics.) A glance at Table 1 confirms that 91% of grade-3 rural children with no parents at home and 90% of grade-3 rural children with one parent at home chose the envious allocation of (1, 1) rather than the more generous and social-welfare maximizing allocation of (1, 2). The comparable figure for grade-3 urban children was 76%.

**Result 8: Grade-3 urban children are significantly more envious, less sharing, less altruistic, and more egalitarian than grade-5 urban children.** In Table 3, this is indicated by the significant coefficients on the Grade3 dummy for envy (p=0.014 without demographics, p=0.096 with demographics), sharing (p=0.001 without demographics, p<0.001 with demographics), altruistic (p=0.014 without demographics, p=0.099 with demographics) and egalitarian (p=0.014 without demographics, p=0.099 with demographics).

**Result 9: In grade 5, rural children are more envious, less sharing, and less altruistic than urban children. The envy and resulting altruistic results are largely driven by the allocation decisions of rural children who have one parent at home.** In Table 3, for envy there are positive coefficients for Ph0, Ph1 and Ph2. They are significant for Ph1 (p=0.002 without demographics, but not significant with demographics) and Ph2 (p=0.083 without demographics, p=0.020 with demographics). For sharing, there are significant negative coefficients for Ph0 (p=0.094 without demographics, p=0.100 with demographics), Ph1 (p=0.001 without demographics, p=0.002 with demographics) and Ph2 (p=0.056 without demographics,
Result 10: For urban children, Raven affected only sharing in grade 5 with higher Raven associated with less sharing. None of the other demographic or psychological controls were significant. In Table 3, model 4, Raven is negative and significant for sharing ($p=0.047$) and not significant for any other allocation task.

5. Conclusions

Consistent with Fehr et al. (2008, 2013), we find that 10- to 11-year-old urban children in grade 5 are less egalitarian and more altruistic than 8- to 9- year-old urban children in grade 3. In the rural area, there is a significant effect in this direction only for the children who have been left behind by both parents. For other rural children, we observe no statistically significant development in other-regarding preferences with age.

While in grade 3, there are no significant differences among rural children based on migration status, by grade 5 those left behind by both parents perhaps surprisingly exhibit other-regarding preferences that are more pro-social, less envious, more sharing, more altruistic, and less spiteful than those who have at least one parent at home. Thus, children left behind by both parents seem to move more quickly along the development path described by Fehr et al. (2008; 2015) from egalitarianism to altruism. This is consistent with some of the previous literature that focused on other measures of achievement or well-being. For example, Zhou et al. (2015) examined nine indicators of health, nutrition, and education, and found that children left behind by one or both parents performed as well or better than children with both parents at home. Similarly, Xu and Xie (2015) found that children left-behind by one or both parents were neither better nor worse off “in nearly every aspect of their lives.” (p. 510). Moreover, Chen et al. (2009) and Bi and Oyserman (2015) found that children left behind by one or both parents did as well academically as those with both parents at home. None of these studies examined children left behind by both parents separately from children left behind by one parent so they were unable to identify any differences such as those we found between these two groups of children. As noted
in the introduction, other studies reach more pessimistic conclusions about the effects of being left behind (e.g. Zhao, Chen et al., 2014; Zhao, Yu et al., 2014; Zhang, Li et al. 2014; Zhan et al. 2014.) Indeed, Zhou, Murphy and Tao (2014) and Murphy, Zhou and Tao (2016) find evidence that children left behind by both parents are more negatively affected on some measures of well-being than those left behind by just one parent.

We find important differences between urban and rural children. In grade 3, rural children left behind by one or both parents are more envious and hence less altruistic than urban children. By grade 5, the rural children left behind by both parents exhibit much less envy and hence more altruism, catching up to their urban counterparts. However, for rural children with one parent at home, this is not the case. This is puzzling, suggesting that the observed urban-rural differences in the development of other-regarding preferences are not due to lack of parental care. Indeed, the children left behind by both parents are the rural children who most resemble their urban counterparts in their allocation decisions.

A full explanation of this unexpected finding is beyond the scope of this study. It is possible that rural children left behind by both parents mature more quickly when they are given more responsibility to take care of themselves. It is also possible that the correlation between being left behind by both parents and more rapid development of altruistic preferences may arise from selection issues. As mentioned in footnote 3 above, Hao et al. (2016) find differences in preferences between adult migrants and non-migrants in some contexts. Moreover, perhaps both parents choose to migrate more often when their children are apparently on a more stable development path, comparable to the urban children. In any case, it does not appear that being left behind by both parents has a deleterious or retarding effect on the development of other-regarding economic preferences.
References:


International Journal of Comparative Sociology, 50, 155–182.
Population, Place and Space, 13(3), 179–191.


Table 1 Key Data Overview

<table>
<thead>
<tr>
<th></th>
<th>Rural Zero Parents at Home (n=132)</th>
<th>Rural One Parent at Home (n=98)</th>
<th>Rural Both Parents at Home (n=50)</th>
<th>Rural Aggregate (n=280)</th>
<th>Urban (n=190)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grade 3 (n=69)</td>
<td>Grade 5 (n=63)</td>
<td>Grade 3 (n=42)</td>
<td>Grade 5 (n=56)</td>
<td>Grade 3 (n=91)</td>
</tr>
<tr>
<td>Pro-social(^a)</td>
<td>1.00</td>
<td>0.86</td>
<td>1.00</td>
<td>0.73</td>
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<td>Envy(^a)</td>
<td>0.91</td>
<td>0.62</td>
<td>0.90</td>
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<td>0.85</td>
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<tr>
<td>Sharing(^a)</td>
<td>0.72</td>
<td>0.67</td>
<td>0.64</td>
<td>0.52</td>
<td>0.71</td>
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<tr>
<td>Altruistic(^a)</td>
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<td>0.33</td>
<td>0.10</td>
<td>0.13</td>
<td>0.15</td>
</tr>
<tr>
<td>Egalitarian(^a)</td>
<td>0.91</td>
<td>0.52</td>
<td>0.90</td>
<td>0.61</td>
<td>0.85</td>
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<tr>
<td>Spiteful(^a)</td>
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<td>0.10</td>
<td>0.00</td>
<td>0.18</td>
<td>0.00</td>
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<tr>
<td>Raven-Intelligence(^d)</td>
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<td>6.98</td>
<td>4.60</td>
<td>7.34</td>
<td>4.29</td>
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<tr>
<td>Boys(^a)</td>
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<td>0.57</td>
<td>0.62</td>
<td>0.59</td>
<td>0.61</td>
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<tr>
<td>Han-Ethnicity(^a)</td>
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<td>Family Wealth(^f)</td>
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<td>Number of Siblings</td>
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<td>School Engagement(^g)</td>
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<td>2.04</td>
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<td>Locus of Control(^g)</td>
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<td>2.11</td>
<td>1.76</td>
<td>2.30</td>
<td>1.68</td>
</tr>
</tbody>
</table>

Notes: \(^a\)-Frequency choosing the alternative or in the category indicated by the label, e.g. in the first game the prosocial choice. \(^b\)-Number of questions answered correctly (out of 12 questions) on the Raven test. \(^c\)-Number of household material possessions. \(^d\)-Level of school engagement (with the highest level represented by 1 and the lowest level represented by 4) and locus of control (with the highest internal locus of control represented by 1 and the highest external locus of control represented by 4).
Table 2 The impact of age and parental migration status on social preferences: Rural data (n=280)

<table>
<thead>
<tr>
<th>Model 1: With no cognitive intelligence or other demographic controls</th>
<th>Pro-social</th>
<th>Envy</th>
<th>Sharing</th>
<th>Altruistic</th>
<th>Egalitarian</th>
<th>Spiteful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade3</td>
<td>0.14 (0.14)</td>
<td>0.29*** (0.04)</td>
<td>0.06 (0.13)</td>
<td>-0.25*** (0.06)</td>
<td>0.39** (0.11)</td>
<td>-0.10 (0.09)</td>
</tr>
<tr>
<td>Ph1or2</td>
<td>-0.13** (0.08)</td>
<td>0.22*** (0.06)</td>
<td>-0.15** (0.05)</td>
<td>-0.21** (0.06)</td>
<td>0.08 (0.14)</td>
<td>0.08* (0.06)</td>
</tr>
<tr>
<td>Ph2</td>
<td>0.04 (0.08)</td>
<td>-0.11 (0.10)</td>
<td>0.07 (0.10)</td>
<td>0.10 (0.08)</td>
<td>-0.06 (0.11)</td>
<td>-0.09 (0.06)</td>
</tr>
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<td>Grade3-Ph1or2</td>
<td>0.13 (0.08)</td>
<td>-0.23* (0.10)</td>
<td>0.07 (0.10)</td>
<td>0.22* (0.10)</td>
<td>-0.09 (0.12)</td>
<td>-0.08 (0.06)</td>
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<td>Grade3-Ph2</td>
<td>0.04 (0.08)</td>
<td>0.06 (0.16)</td>
<td>-0.002 (0.10)</td>
<td>-0.05 (0.10)</td>
<td>0.009 (0.12)</td>
<td>0.09 (0.06)</td>
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<td>Constant</td>
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<td>0.62*** (0.03)</td>
<td>0.67*** (0.11)</td>
<td>0.33*** (0.05)</td>
<td>0.52*** (0.05)</td>
<td>0.10 (0.09)</td>
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<table>
<thead>
<tr>
<th>Model 2: With cognitive intelligence and other demographic controls</th>
<th>Pro-social</th>
<th>Envy</th>
<th>Sharing</th>
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<th>Egalitarian</th>
<th>Spiteful</th>
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<tbody>
<tr>
<td>Grade3</td>
<td>0.13 (0.12)</td>
<td>0.25** (0.07)</td>
<td>0.02 (0.11)</td>
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<td>0.35** (0.11)</td>
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<tr>
<td>Ph1or2</td>
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<td>-0.21*** (0.05)</td>
<td>0.09 (0.10)</td>
<td>0.07* (0.03)</td>
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<td>Ph2</td>
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</tr>
<tr>
<td>Raven</td>
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<td>0.002 (0.04)</td>
<td>-0.005 (0.03)</td>
<td>-0.02 (0.04)</td>
<td>0.02 (0.01)</td>
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<td>0.03 (0.02)</td>
<td>0.004 (0.03)</td>
<td>0.01 (0.04)</td>
<td>0.007 (0.03)</td>
<td>0.02 (0.04)</td>
<td>-0.02 (0.01)</td>
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<tr>
<td>Raven-Ph1or2</td>
<td>-0.03*** (0.006)</td>
<td>-0.007 (0.03)</td>
<td>0.002 (0.03)</td>
<td>0.01 (0.03)</td>
<td>-0.04 (0.03)</td>
<td>0.02*** (0.003)</td>
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<tr>
<td>Raven-Ph2</td>
<td>0.000 (0.006)</td>
<td>-0.008 (0.03)</td>
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<td>0.006 (0.01)</td>
<td>-0.006 (0.01)</td>
<td>-0.01 (0.01)</td>
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<tr>
<td>Raven-Grade3-Ph1or2</td>
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<td>0.02 (0.04)</td>
<td>0.005 (0.07)</td>
<td>-0.02 (0.04)</td>
<td>0.05 (0.04)</td>
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<tr>
<td>Raven-Grade3-Ph2</td>
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<td>-0.03 (0.03)</td>
<td>-0.006 (0.03)</td>
<td>0.006 (0.05)</td>
<td>0.008 (0.01)</td>
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<td>Other Demographics</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Constant</td>
<td>0.91*** (0.06)</td>
<td>0.74*** (0.10)</td>
<td>0.92*** (0.18)</td>
<td>0.24* (0.10)</td>
<td>0.67*** (0.10)</td>
<td>0.07 (0.08)</td>
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</table>

<table>
<thead>
<tr>
<th>Grade 3 Effects</th>
<th>F=0.01</th>
<th>F=4.06</th>
<th>F=0.01</th>
<th>F=0.01</th>
<th>No</th>
<th>n.s.</th>
<th>n.s.</th>
<th>n.s.</th>
<th>effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ph1or2 in Grade 3 (H0: Ph1or2+ Grade3-Ph1or2=0) No</td>
<td>Effect</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>effect</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Grade 3 Effects</th>
<th>F=1.00</th>
<th>F=0.35</th>
<th>F=1.00</th>
<th>F=1.00</th>
<th>No</th>
<th>n.s.</th>
<th>n.s.</th>
<th>n.s.</th>
<th>effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ph2 in Grade 3 (H0: Ph2+Grade3-Ph2=0) No</td>
<td>Effect</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>effect</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Notes: All coefficients are estimated with linear probability models for binary variables with robust standard errors, reported in parentheses, adjusted for six clusters (rural classes) to control for unobserved class effects. ***, ** and * denote significance at 1%, 5% and 10% respectively. No effect for the Pro-social (Spite) test in Grade 3 indicates that a test statistic could not be calculated. Everyone in Grade 3 made the same pro-social (non-spiteful) choice(s). See footnote 7 in the text for more details on missing data and the number of observations.

Table 3 The impact of age and parental migration status on social preferences: All data (n=470)

<table>
<thead>
<tr>
<th>Model 3: With no cognitive intelligence or other demographic controls</th>
<th>Pro-social</th>
<th>Envy</th>
<th>Sharing</th>
<th>Altruistic</th>
<th>Egalitarian</th>
<th>Spiteful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade3</td>
<td>0.000</td>
<td>0.14**</td>
<td>-0.24***</td>
<td>-0.14**</td>
<td>0.14**</td>
<td>0.000</td>
</tr>
<tr>
<td>Rural Ph0</td>
<td>-0.14</td>
<td>0.003</td>
<td>-0.21*</td>
<td>-0.05</td>
<td>-0.09</td>
<td>0.10</td>
</tr>
<tr>
<td>Rural Ph1</td>
<td>-0.27</td>
<td>0.22***</td>
<td>-0.36***</td>
<td>-0.26***</td>
<td>-0.009</td>
<td>0.18</td>
</tr>
<tr>
<td>Rural Ph2</td>
<td>-0.23</td>
<td>0.11*</td>
<td>-0.29*</td>
<td>-0.16</td>
<td>-0.07</td>
<td>0.09</td>
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<td>-0.15**</td>
<td>0.30*</td>
<td>-0.10</td>
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<td>-0.08</td>
<td>0.37**</td>
<td>0.11</td>
<td>0.16</td>
<td>-0.18</td>
</tr>
<tr>
<td>Grade3-RPh2</td>
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<td>0.02</td>
<td>0.36**</td>
<td>0.06</td>
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<td>0.88***</td>
<td>0.38***</td>
<td>0.62***</td>
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</table>

| Grade 3 Effects RPh0 in Grade 3 (H0: F=0.00) | F=19.74 F=19.74 F=19.74 F=19.74 No |
| RPh0+Grade3-RPh0=0 (H0: F=0.00) | n.s. p=0.002 n.s. p=0.002 p=0.002 Effect |
| RPh1 in Grade 3 (H0: F=0.00) | F=8.40 F=8.40 F=8.40 F=8.40 F=8.40 |
| RPh1+Grade3-RPh1=0 (H0: F=0.00) | n.s. p=0.002 n.s. p=0.002 p=0.002 n.s. |
| RPh2 in Grade 3 (H0: F=0.00) | F=1.85 F=1.85 F=1.85 F=1.85 No |
| RPh2+Grade3-RPh2=0 | Effect n.s. n.s. n.s. n.s. Effect |

Model 4: With cognitive intelligence and other demographic controls

<table>
<thead>
<tr>
<th>Grade3</th>
<th>Pro-social</th>
<th>Envy</th>
<th>Sharing</th>
<th>Altruistic</th>
<th>Egalitarian</th>
<th>Spiteful</th>
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<tbody>
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<td>-0.08</td>
<td>0.08</td>
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</tr>
<tr>
<td>Rural Ph1</td>
<td>-0.26</td>
<td>0.23***</td>
<td>-0.35***</td>
<td>-0.27**</td>
<td>0.01</td>
<td>0.15</td>
</tr>
<tr>
<td>Rural Ph2</td>
<td>-0.27</td>
<td>0.09</td>
<td>-0.29**</td>
<td>-0.14</td>
<td>-0.13</td>
<td>0.09</td>
</tr>
<tr>
<td>Grade3-RPh0</td>
<td>0.13</td>
<td>0.12</td>
<td>0.29**</td>
<td>-0.08</td>
<td>0.22*</td>
<td>-0.10</td>
</tr>
<tr>
<td>Grade3-RPh1</td>
<td>0.25</td>
<td>-0.07</td>
<td>0.42***</td>
<td>0.11</td>
<td>0.14</td>
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<td>Grade3-RPh2</td>
<td>0.27</td>
<td>-0.004</td>
<td>0.47**</td>
<td>0.06</td>
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<td>Raven</td>
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<td>-0.02**</td>
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<td>Raven-RPh0</td>
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<td>0.008</td>
<td>-0.06*</td>
<td>0.03***</td>
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<td>Raven·RPh2</td>
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<td>0.05</td>
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<td>-0.07**</td>
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<td>-0.02</td>
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<td>Other Demographics</td>
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<td>Constant</td>
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<td>0.71***</td>
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<td>0.72***</td>
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<td>(0.06)</td>
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<td>(0.16)</td>
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Grade 3 Effects

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<tr>
<th></th>
<th>F=0.16</th>
<th>F=6.83</th>
<th>F=1.84</th>
<th>F=6.87</th>
<th>F=7.33</th>
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<td>RPh0 in Grade 3 (H₀):</td>
<td>n.s.</td>
<td>p=0.02</td>
<td>n.s.</td>
<td>p=0.02</td>
<td>p=0.02</td>
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<tr>
<td>RPh0+Grade3·RPh0=0</td>
<td>p=0.12</td>
<td>p=0.25</td>
<td>F=5.39</td>
<td>F=5.36</td>
<td>F=1.86</td>
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<td>RPh1 in Grade 3 (H₀):</td>
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<td>n.s.</td>
<td>p=0.05</td>
<td>p=0.05</td>
<td>n.s.</td>
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<tr>
<td>RPh1+Grade3·RPh1=0</td>
<td>F=0.20</td>
<td>F=1.22</td>
<td>F=7.67</td>
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<td>F=1.30</td>
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<td>RPh2 in Grade 3 (H₀):</td>
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<td>n.s.</td>
<td>p=0.02</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

Notes: All coefficients are estimated with linear probability models for binary variables with robust standard errors, reported in parentheses, adjusted for 10 clusters (urban and rural classes) to control for unobserved class effects. ***, ** and * denote significance at 1%, 5% and 10% respectively. No effect for the Pro-social (Spite) test in Grade 3 indicates that a test statistic could not be calculated. Everyone in Grade 3 made the same pro-social (non-spiteful) choice(s). See footnote 7 in the text for more details on missing data and the number of observations.